

Nunavik

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INRS - Institut National de la Recherche Scientifique

Soil Moisture Active and Passive (SMAP) Mission Workshop, 6-7 October 2009

Centre - Eau Terre Environnement

**INRS**

Université d'avant-garde

# NUNAVIK

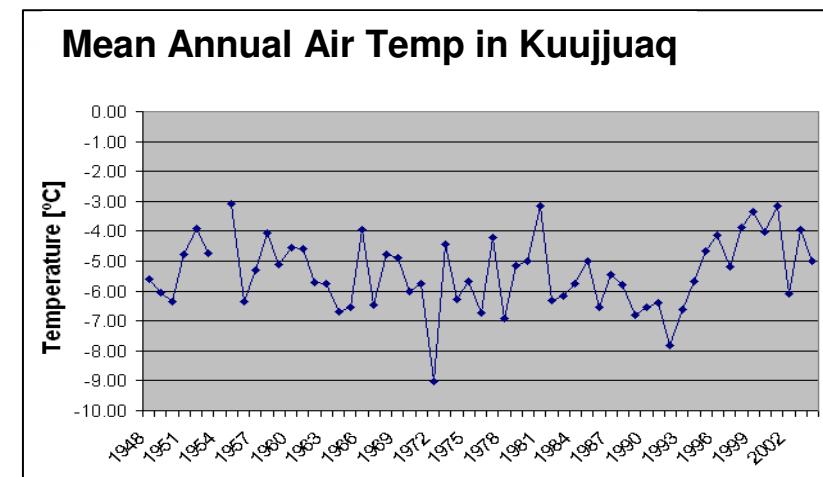


- Quebec's arctic region.
- 507 000 km<sup>2</sup>.
- North of the 55th parallel.
- Tundra and taiga forest.
- Numerous lakes and large rivers.
- **Kuujjuaq** is the administrative center of Nunavik, is located right on the tree line.



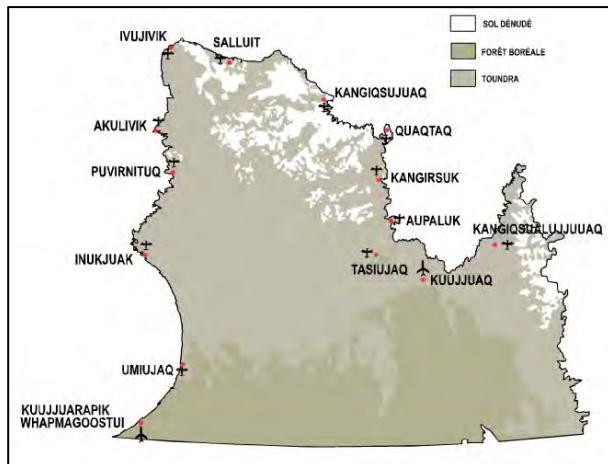
## WEATHER

- Climate of the immense territory of Nunavik ranges from sub-arctic to arctic.
- Region's proximity to polar air masses results in a low degree of humidity and scarce precipitation.
- Total annual precipitation in some areas of Nunavik can be as low as 200 mm.

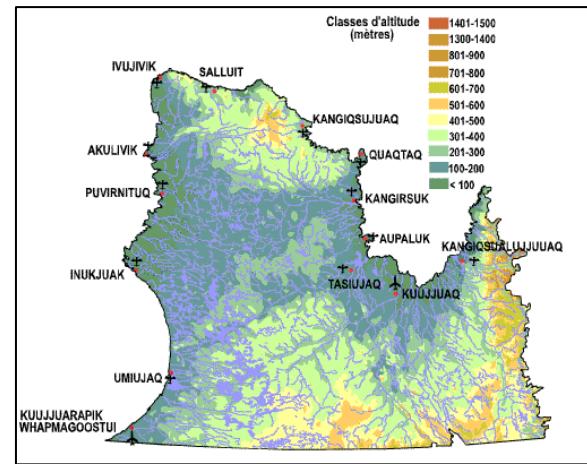


Source: Data from Environment Canada

## Vegetation of Nunavik



## Relief of Nunavik



## Tree Line



## Permafrost map



# The CEN Network



8 field stations  
75 climate stations

CENTRE D'ÉTUDES NORDIQUES  
CEN Centre for Northern Studies

Ward Hunt Island, 83°N

Bylot Island, 73°N

Salluit, 62°N

Boniface, 58°N

Umiujaq & LEC, 56°N

Kuujjuarapik, 55°N  
Whapmagoostui

Radisson, 53°N

**Quebec City**  
CEN secretariat  
and data centre  
at Laval University



## Gradient of Ecozones

**Polar desert:**  
Discontinuous plant cover  
and perennially ice-covered  
Ward Hunt Lake  
Lat. 83N (Quttinirpaaq National Park)



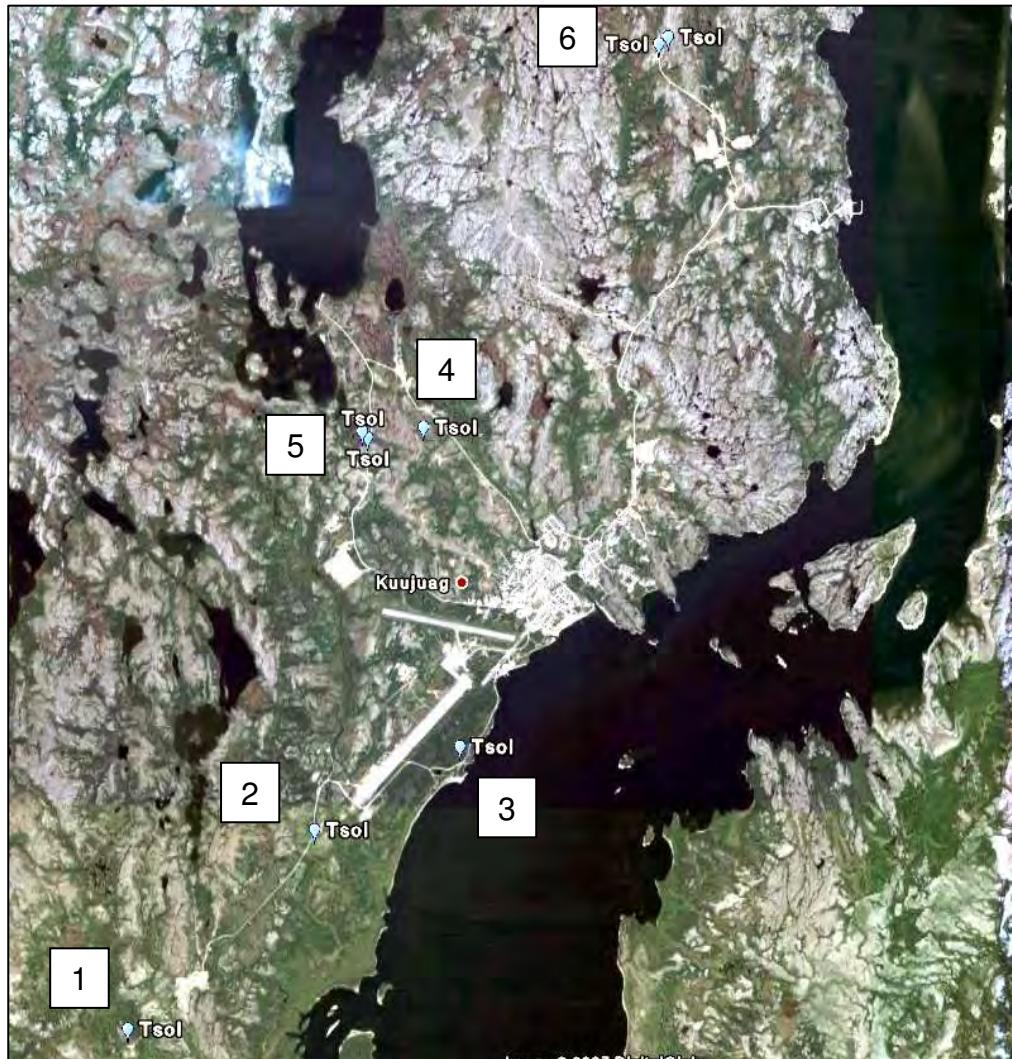
**Treeline:**  
Permafrost thaw lakes  
and forest-tundra at  
Lat. 55N (Kuujjuarapik)

ARIF station upgrade,  
on-track for 2010:

Ward Hunt Island Observatory  
Lat 83N, Nunavut  
Quttinirpaaq National Park

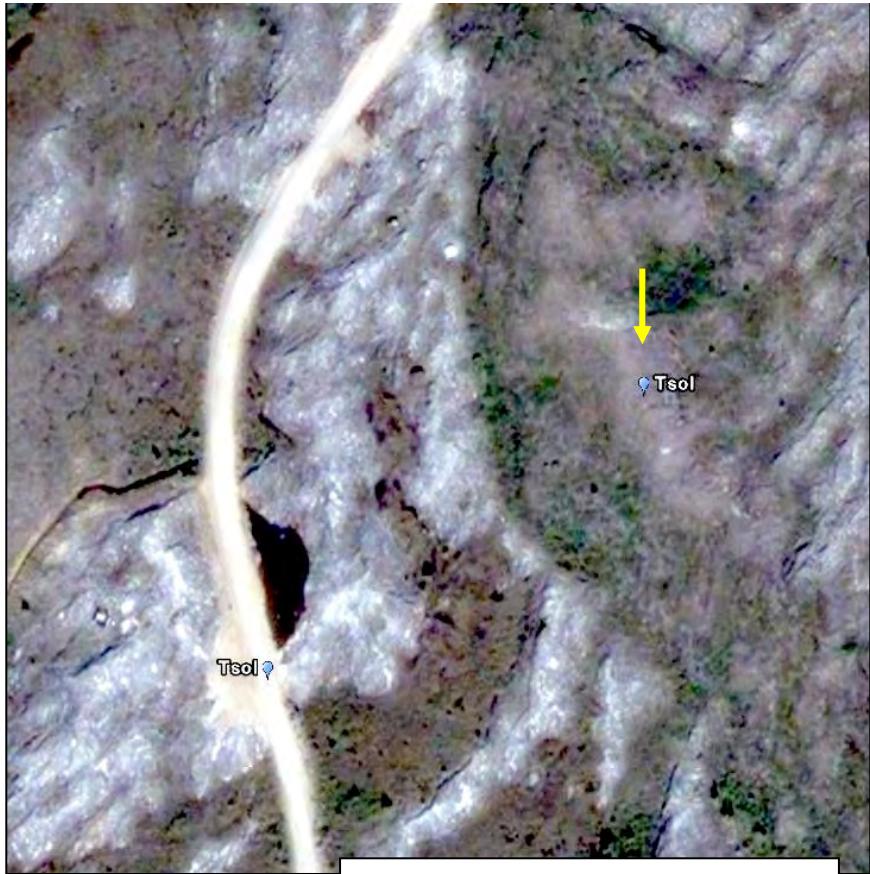
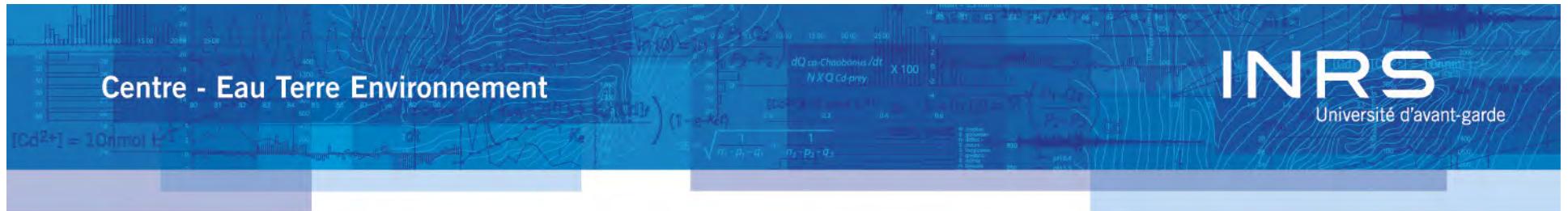
The CEN Network monitors climate  
(atmosphere and permafrost) over a  
4000 km North-South transect of Canada  
and conducts research & advancing training  
on northern ecosystems and geosystems





Surface soil temperature



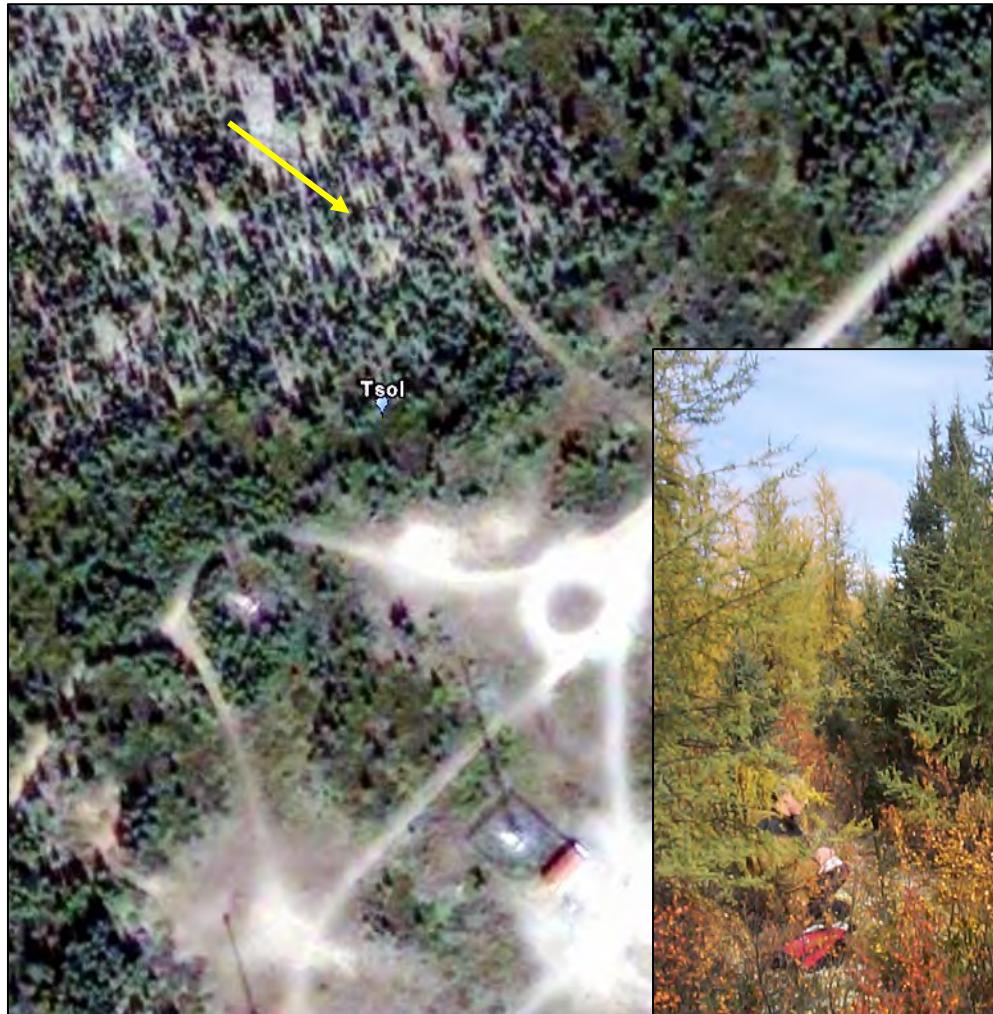
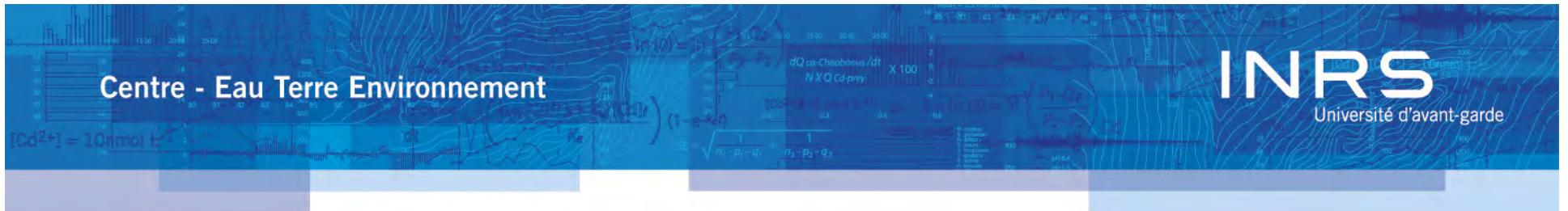


58°10.006N ; 68°22.441W  
Ouvert, versant sud colline  
Matières organiques  
Mousse et lichen



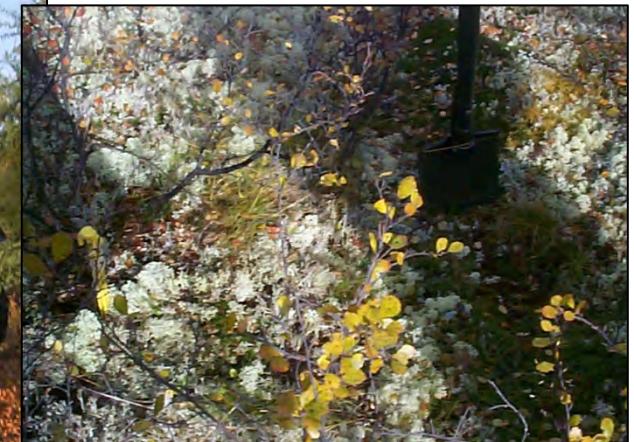
Sensor #6



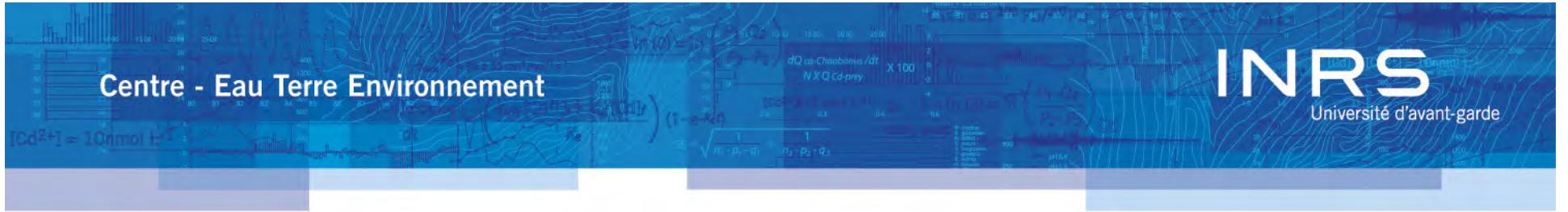


58°12.771N ; 68°21.962W

Boisé mélèzes assez dense  
Lichen et arbustes  
Sable fin  
Derrière les 2 grosses roches



Sensor #1



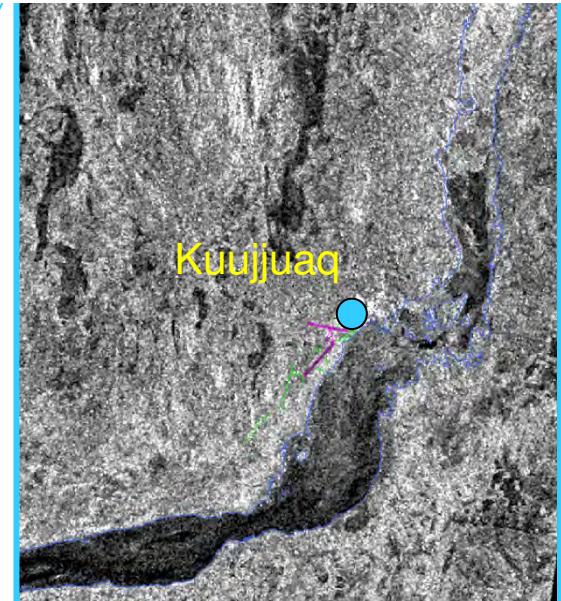
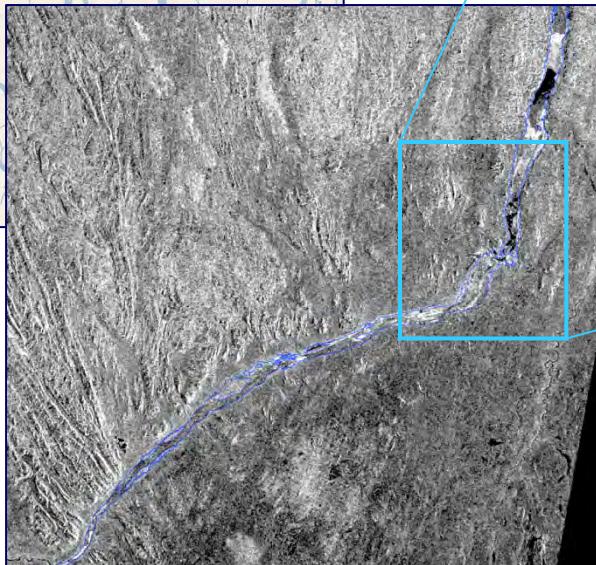
## SATELLITE DATA : Passive Microwave Data

- Brightness Temperature (Tb)

SATELLITE	SENSOR	FREQUENCY	RESOLUTION
EOS-AQUA	AMSR-E	18,7 GHZ V 36,5 GHZ V	25 km
<b>Product:</b> AMSR-E/Aqua Daily L3 Surface Soil Moisture, InterpretiveParms, & QC EASE-GRIDS			
<b>Source:</b> EOS Data Gateway <a href="http://nsidc.org/~imswww/pub/imswelcome/index.html">http://nsidc.org/~imswww/pub/imswelcome/index.html</a>			

Spécifications de l'AMSR-E. Source : Jones, 2007

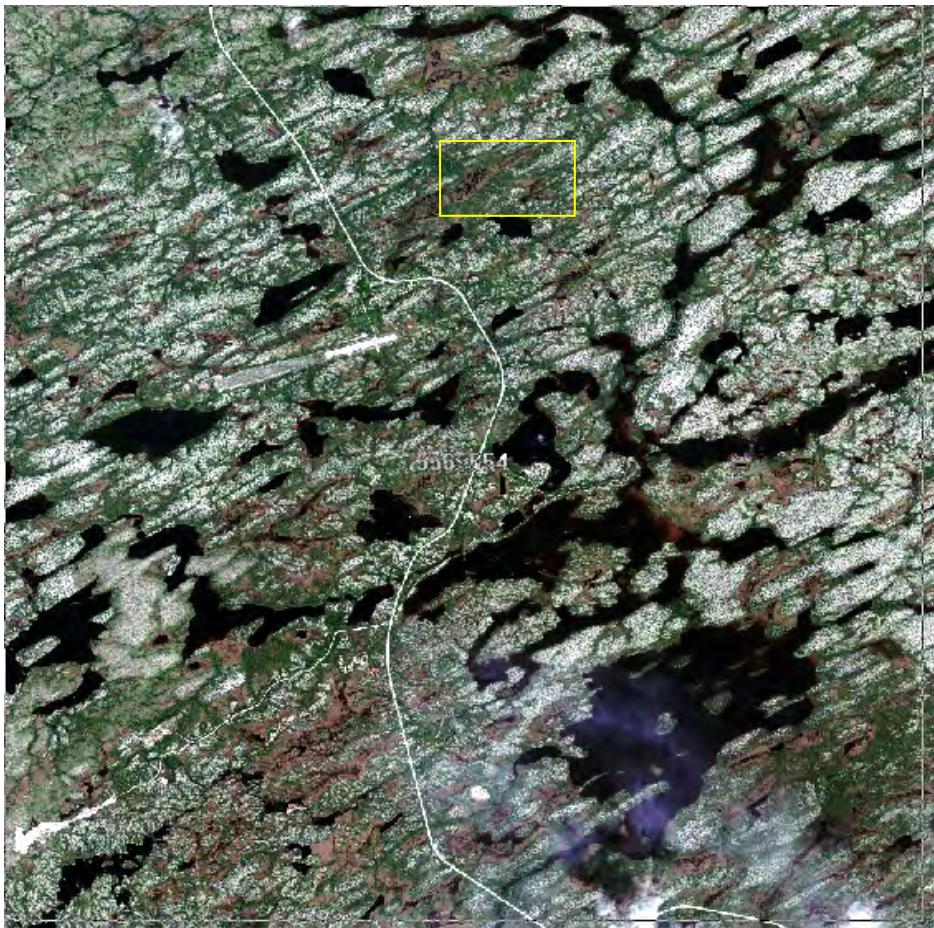
Fréquence (GHz)	6,9	10,7	18,7	23,8	36,6	89
Résolution (Km)	60	60	25	25	15	5
Largeur de bande (MHz)	350	100	200	400	1000	3000



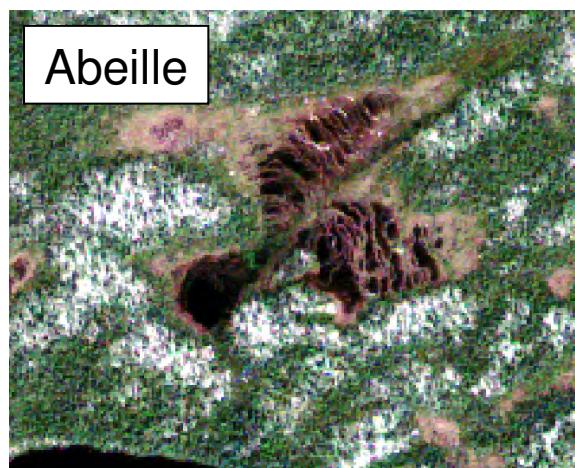
# RADARSAT-1 Kuujjuak

RADARSAT-1 image of the Koksoak  
River, May 14, 2007

## Couverture du site (64 km<sup>2</sup>)

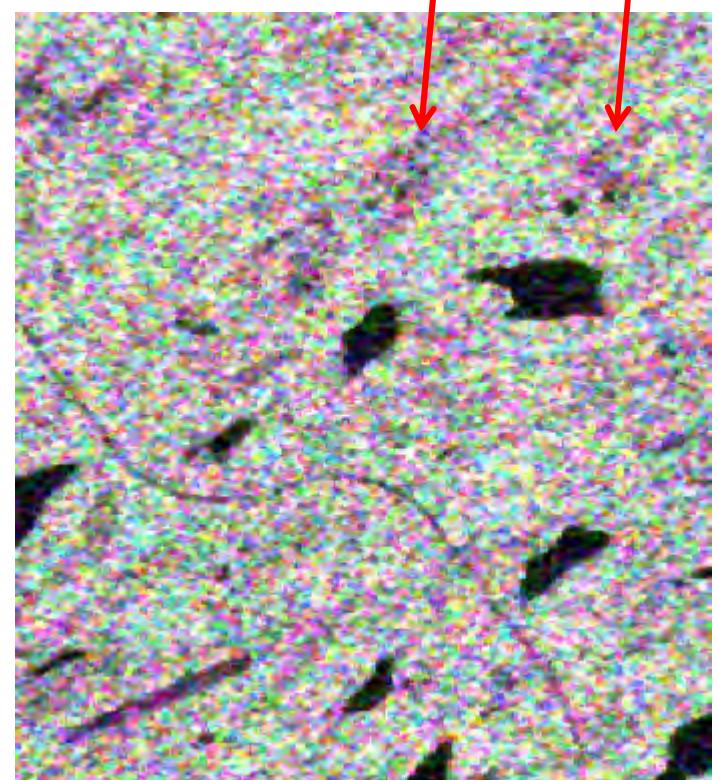
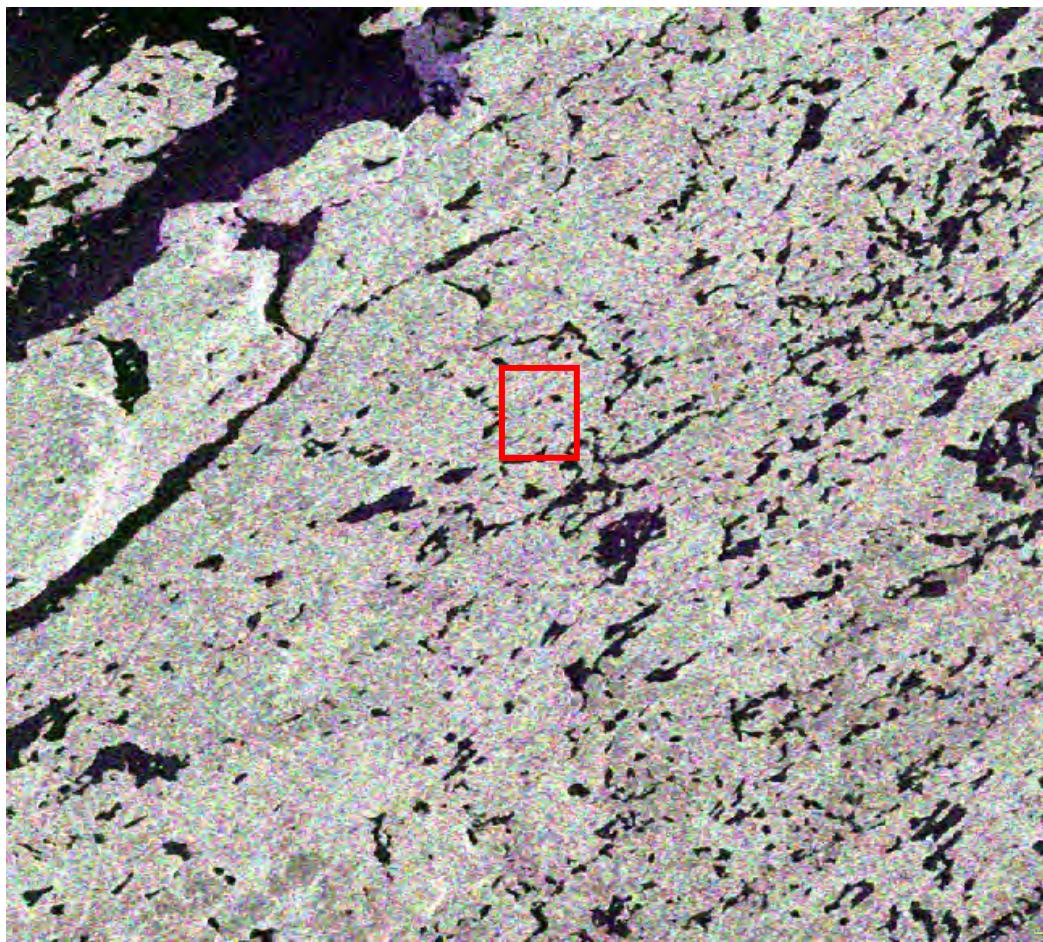


Chenille



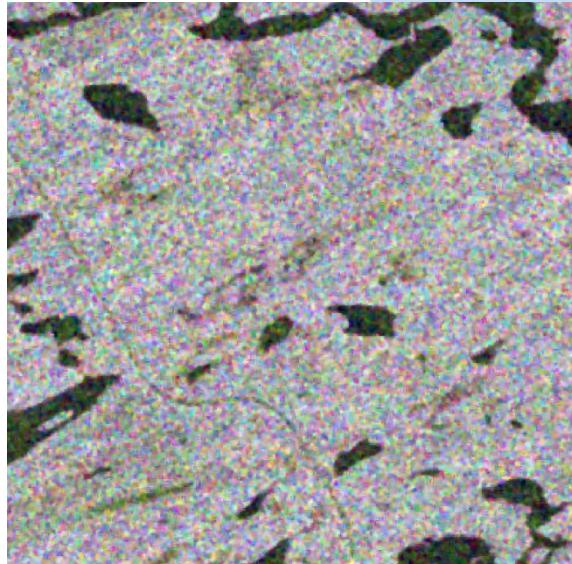
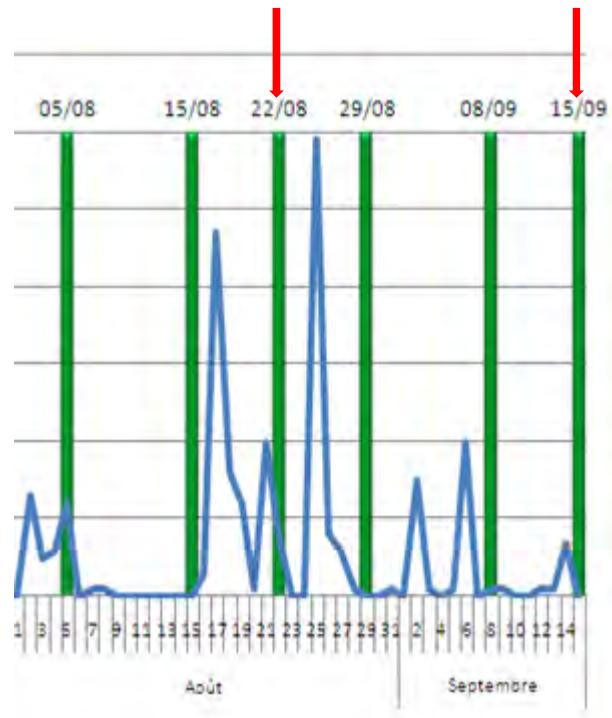
Abeille

## Couverture du site ( $625 \text{ km}^2$ )

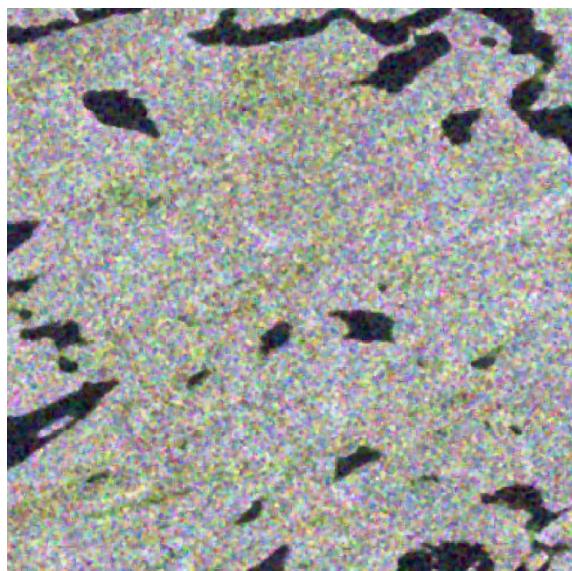


Chenille      Abeille

## Variation temporelle – Images radar

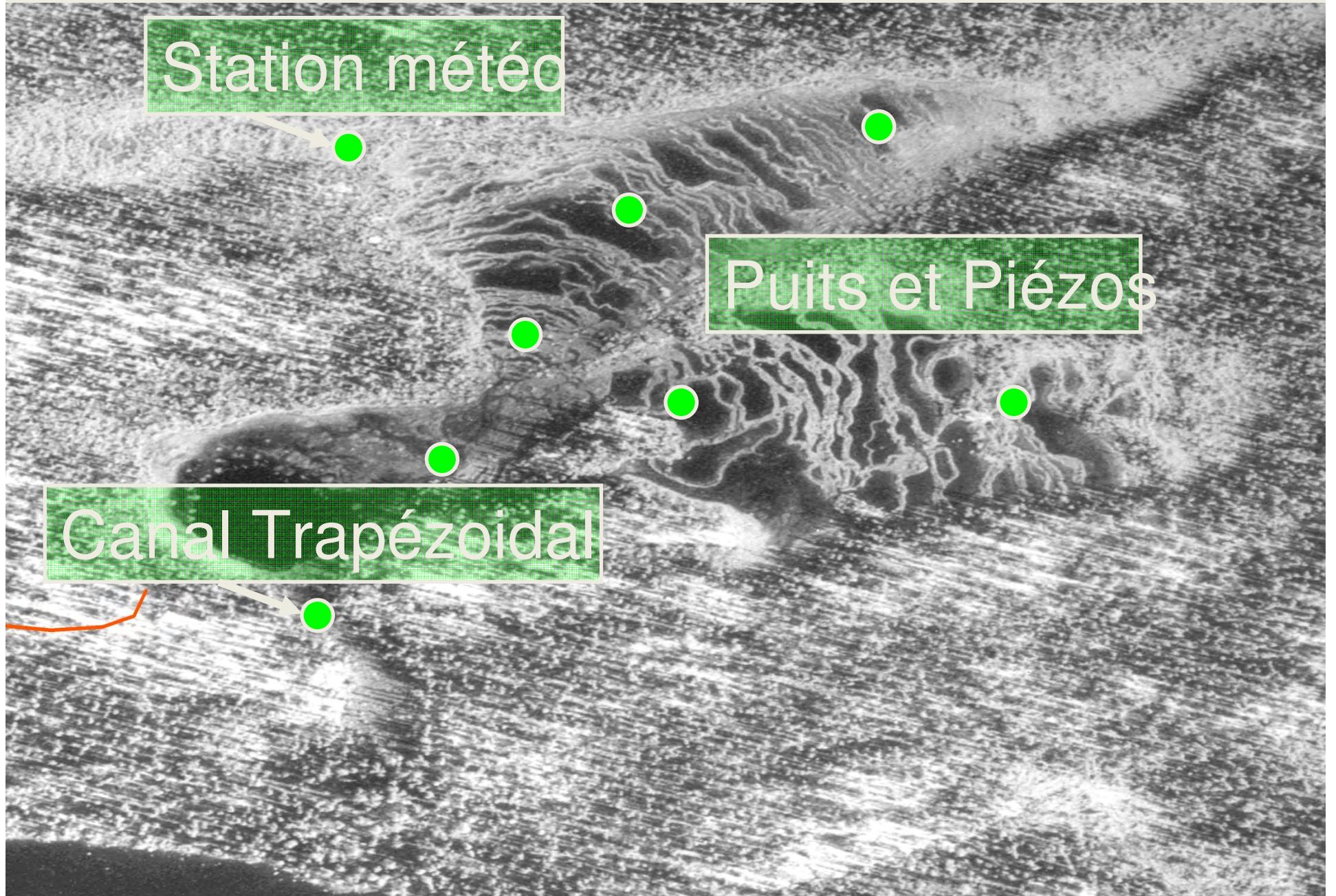


22 août 2009

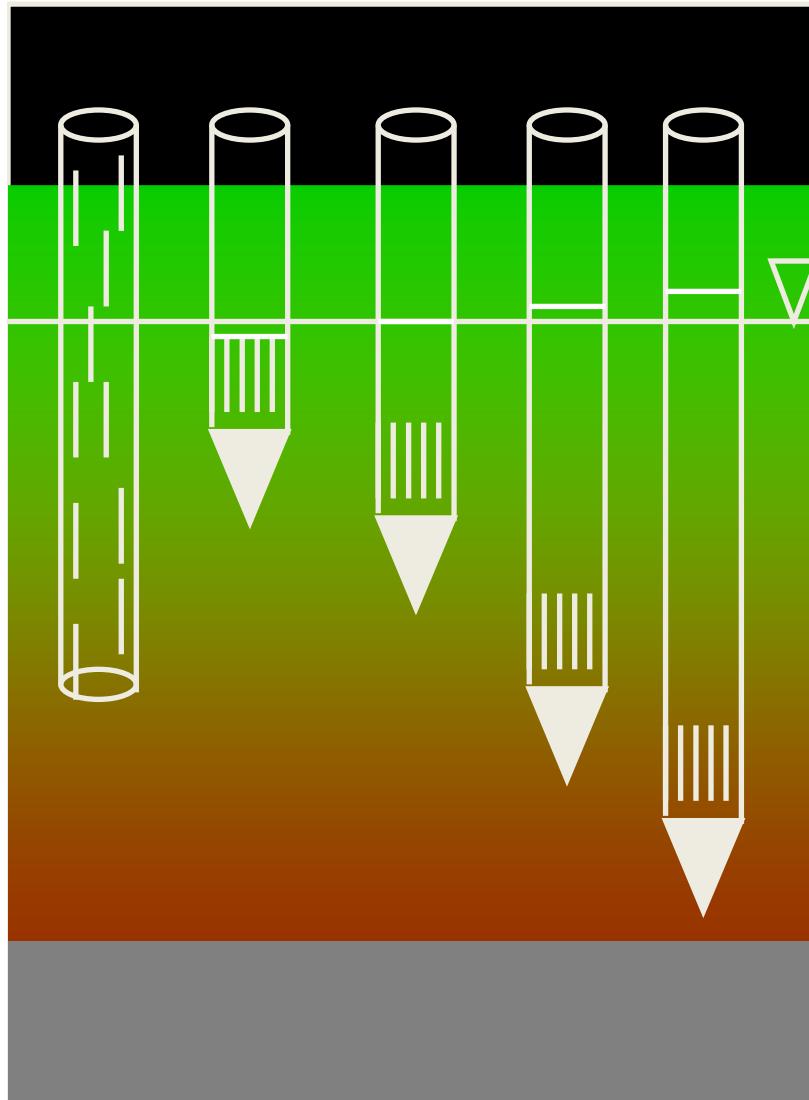


15 septembre 2009

# Plan du site - Abeille



# Stockage: Puits et Piézos







28.85 inHg ↑

3°C



09/28/08 08:00 AM

AQUALYSE2



27.87 inHg ↓

° -1°C



11/16/08 10:00 AM

AQUALYSE2

# Évaporation

- Tour à flux
- Lysimètres
  - Sandra McInnis

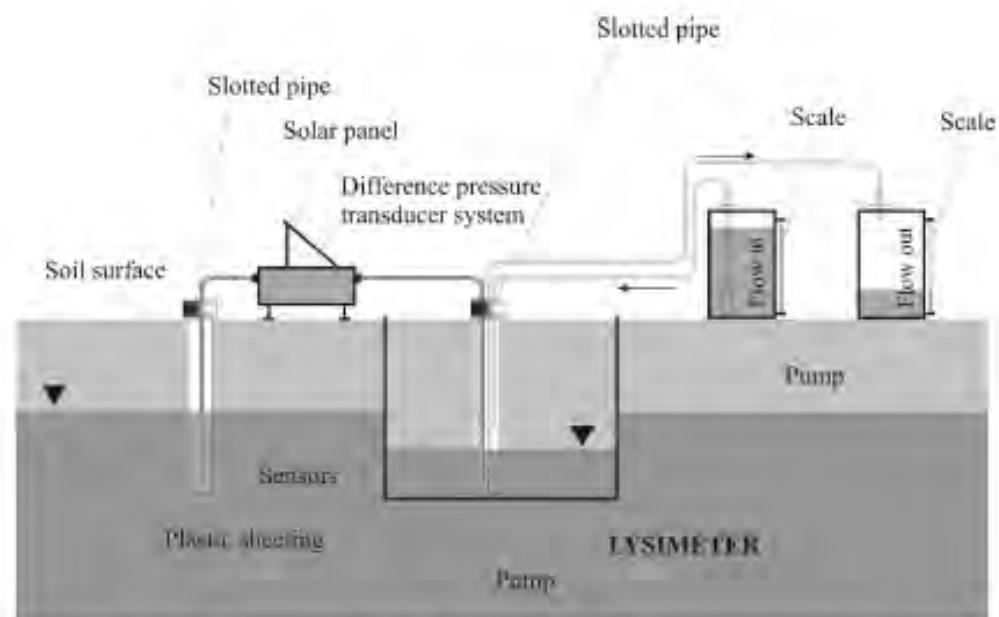


Fig. 4. Experimental set up for the determination of capillary rise and evapotranspiration  
 $g$  = Groundwater level

An easily installable groundwater lysimeter to determine water balance components and hydraulic properties of peat soils

Kai Schwaerzel<sup>1</sup> and Heiko P. Bohl<sup>2</sup>

Hydrology and Earth System Sciences, 7(1), 23–32 (2003)

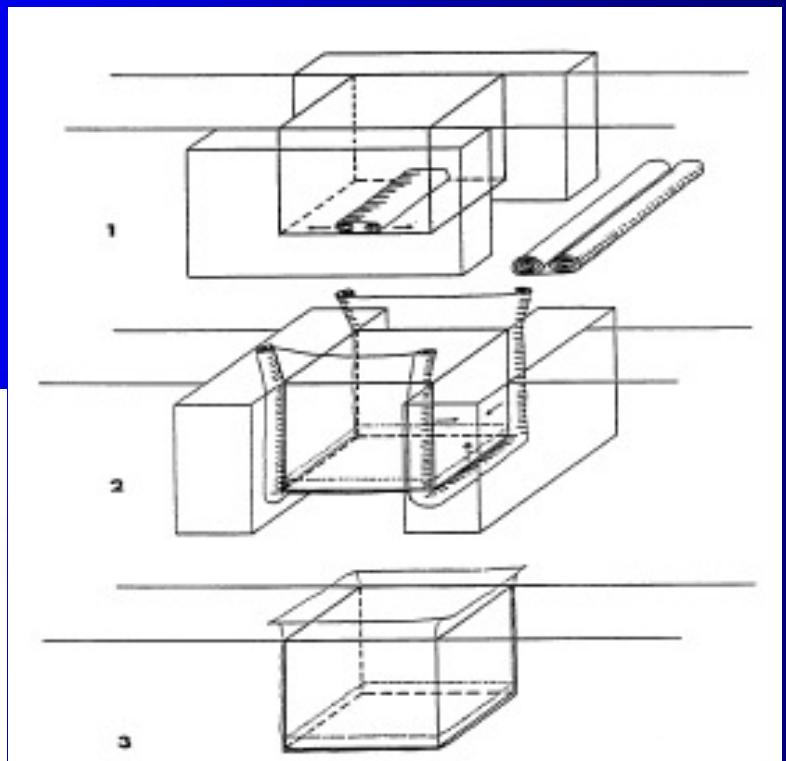
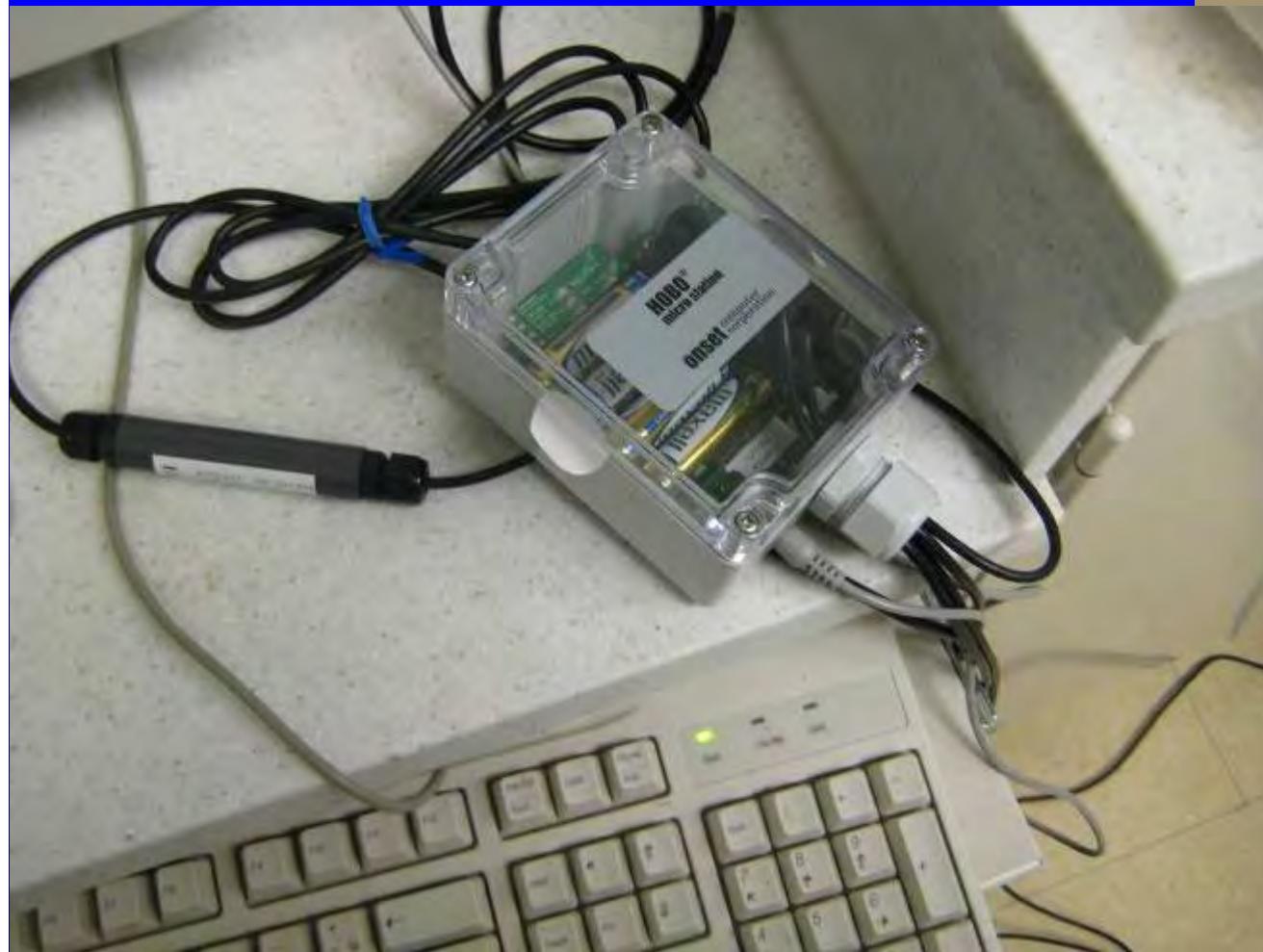
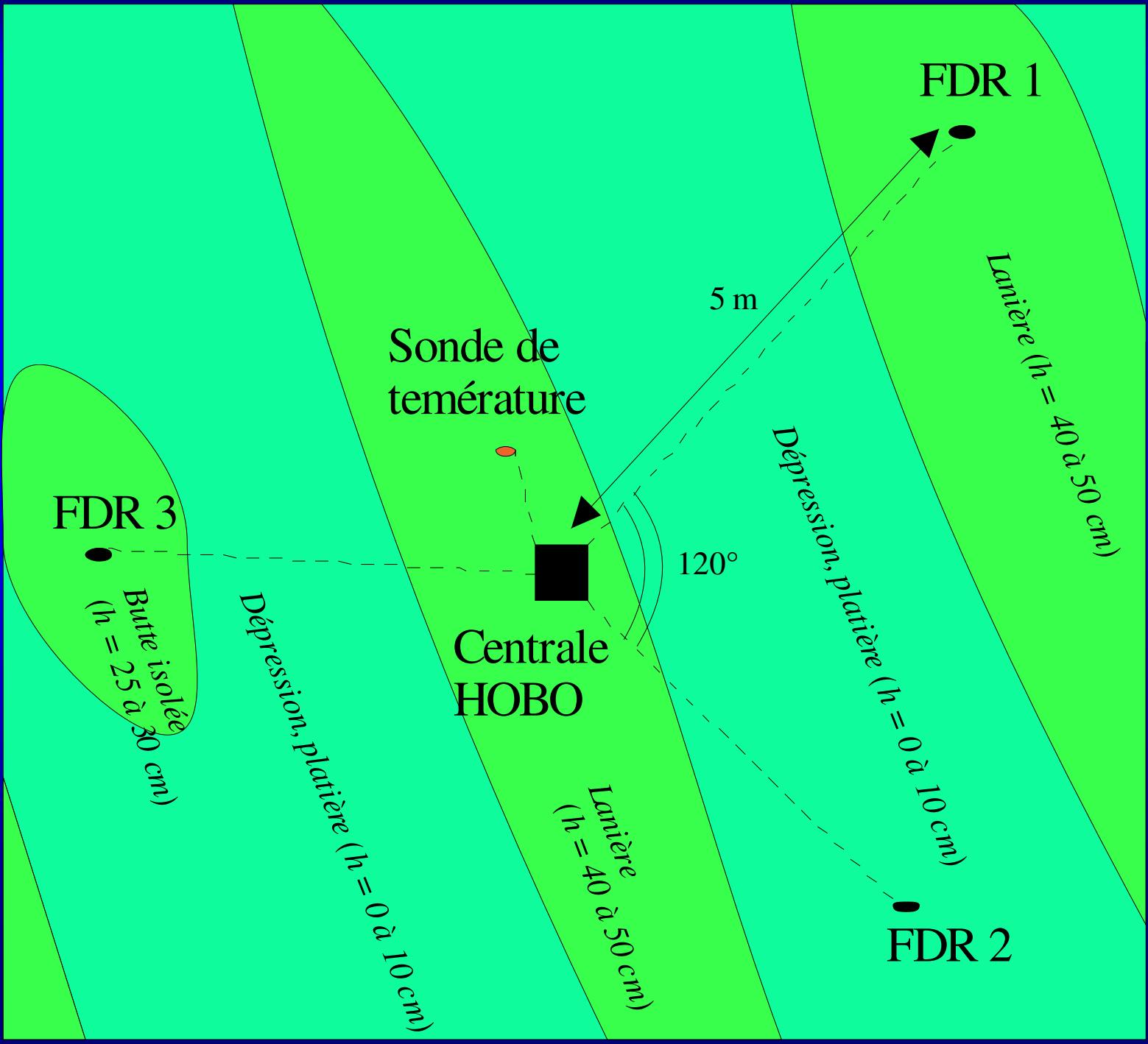
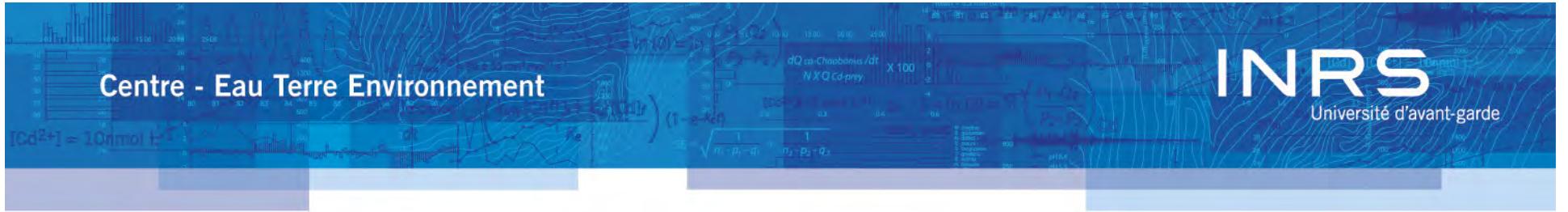


Fig. 3. Principle of lysimeter installation

# Capteurs d'humidité du sol







**THANK YOU**